

THE ACTION OF NEODYMIUM LASERS ON THE PARENCHYMA OF THE TESTIS

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The discovery of lasers, a new source of energy, and information on their properties have not only attracted the attention of engineering specialists but have also led to their extensive application in biology and medicine in the USSR and elsewhere.

Research into the study of the characteristic action of laser radiation on the organs and tissues of laboratory animals and man is an essential preparatory stage before the clinical application of lasers [1, 2, 7].

Much research into the action of laser beams has been devoted to injuries of the eyes and skin and much less is known about the effect of laser radiation on the internal organs [3-6].

Nevertheless this is an important matter in urology and endocrinology and, in particular, in the treatment of malignant tumors.

To study the effect of laser radiation on the testis experiments were carried out on 10 chinchilla rabbits. For local anesthesia a 0.5% solution of procaine was injected into the spermatic cord. A Soviet OKG-500 neodymium laser emitting a pulsed radiation with wave length 1.06 nm, diameter of the focused beam 3 mm, and exposure 0.003 sec was used. The skin of the scrotum was incised with an ordinary scalpel, after which the laser beam was applied to the parenchyma of the testis. The mean density of energy to each testis was between 637 and 890 J/cm². The operation wound was closed with silk sutures. The animals were killed from 30 min to 30 days later. The testes were studied histologically in sections stained with hematoxylin-eosin and by Van Gieson's method. After incision of the skin of the scrotum with a scalpel bleeding was observed but this was quickly stopped by means of the unfocused beams of the same laser apparatus.

The results of the microscopic examination of the parenchyma of the testis immediately after irradiation showed severe local coagulation necrosis at the site of action of the laser beam. On the first day, besides coagulation necrosis, severe edema of the stroma, congestion of the blood vessels, and solitary hemorrhages were observed and circular and oval foci of destruction in which the cellular structure could not be defined were found in the tissues; these findings probably indicate local evaporation of the tissue fluid. Up to 10 days later the zone of coagulation necrosis was sharply demarcated as before, but the edema of the stroma was less marked. After 15-20 days destruction of the seminiferous tubules was conspicuous and sclerosis of the stroma was observed. The formation of fibrous tissue with a fibrositic reaction and with destruction of small masses of necrotic material could be seen at the edges of the foci of damage. By the 30th day connective tissue had partly invaded the areas of necrosis and blood vessels had formed in them. These experiments showed that all the tissue structures of the testis are highly sensitive to the traumatic action of the neodymium laser. Lesions produced by the beam of the OKG-500 neodymium laser are characterized by foci of coagulation necrosis with clearly defined edges, rupture of blood vessels, and the appearance of structureless foci within the tissues. Scar tissue forms in the parenchyma of the testis at the site of action of the laser beam in the course of 3 weeks.

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